STATE OF NEW HAMPSHIRE

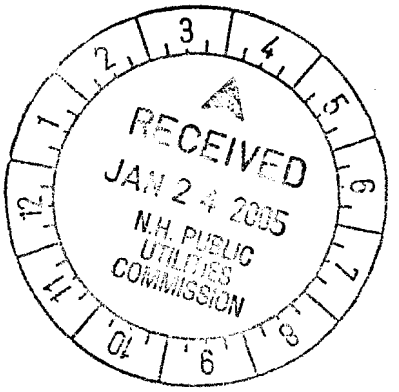
CHAIRMAN
Thomas B. Getz

COMMISSIONERS
Graham J. Morrison
Michael D. Harrington

EXECUTIVE DIRECTOR
AND SECRETARY
Debra A. Howland

PUBLIC UTILITIES COMMISSION
21 S. Fruit Street, Suite 10
Concord, N.H. 03301-2429

Tel. (603) 271-2431
FAX (603) 271-3878
TDD Access: Relay NH
1-800-735-2964
Website:
www.puc.nh.gov



January 24, 2005

Ms. Debra Howland
Executive Director & Secretary
New Hampshire Public Utilities Commission
21 South Fruit Street, Suite 10
Concord, New Hampshire 03301

Re: DG 04-133 & DG 04-175 – KeySpan
Investigation

Dear Ms. Howland:

Attached please find the original and 8 copies of the Joint Testimony of John Adger & Yavuz Arik of Liberty Consulting Group, on behalf of Staff, in the above referenced docket.

Sincerely,

Edward N. Damon

Edward N. Damon
Staff Attorney

Attachments
END/db

cc: Service List

New Hampshire Public Utilities Commission

EnergyNorth Natural Gas, Inc.

d/b/a KeySpan Energy Delivery New England

Integrated Resources Plan and Gas Dispatch Investigation

DG 04-133

DG 04-175

Testimony of

John B. Adger, Jr./Yavuz Arik

Q. Please state your names, occupations and business addresses.

A. My name is John B. Adger, Jr. I am a Senior Consultant with The Liberty Consulting Group. My business address is P. O. Box 237, Quentin, Pennsylvania 17083. My name is Yavuz Arik. I am a consultant to The Liberty Consulting Group. For this project, my business address is P. O. Box 237, Quentin, Pennsylvania 17083.

Q. Please summarize your educational and professional experience.

A. Summaries of our education and experience are attached at JBA-1 and YA-1, respectively.

Q. Have you previously testified in regulatory proceedings?

A. We testified together before this Commission in DG 04-152, EnergyNorth Natural Gas, Inc. d/b/a KeySpan Energy Delivery New England's (ENGI's, or the Company's) 2004-2005 Winter Cost of Gas proceeding. Lists of our other appearances before regulatory commissions were attached to that testimony.

Q. What is the purpose of your testimony in this proceeding?

A. In late August of 2004, the Commission hired The Liberty Consulting Group to assist the Commission's Staff in evaluating the Company's gas supply planning, including supply contracting and dispatch. In the course of that work, we have examined the Integrated Resource Plan (IRP) that the Company filed on August 2, 2004, and we have studied the Company's actions in engaging an asset manager, and in operating its gas-supply portfolio in conjunction with its asset manager. The purpose of this testimony is to report to the Commission on our progress and on our plans for completing our work.

The Integrated Resource Plan

Q. How does the Company prepare its demand forecasts?

A. The Company uses an end-use demand model to forecast annual incremental growth in its traditional markets over the period of interest (November 1, 2004 through October 31, 2009 for this IRP). The Company then adds specific requirements for non-traditional markets, such as natural gas vehicles and large-scale cogeneration projects, and subtracts amounts for demand-side management savings. Finally, the resulting incremental demand forecasts are added to normalized sendout information from a base year (May, 2003 through April, 2004 in this case).

Q. What is your assessment of the Company's forecast?

A. The Company's end-use model is getting a bit dated now. It is based, in part at least, on a home energy-use survey conducted for Boston Gas Company in 1998. Boston Gas had the entire model updated in late 1999,[1] but some of the data used in the update extends

[1] Reports on the home energy use survey and the model update are presented as Appendices B and A, respectively, to the Company's August 2, 2004 filing.

back to 1993.[2] We tested the Company's results against econometric methods that we favor.[3] The tables below show how our results compare with the Company's.

Customer Requirements, Base Case Demand Scenario, Normal-Year Weather

(MMBtu)

	2004-05	2005-06	2006-07	2007-08	2008-09
ENGI results	13,207,200	13,631,100	14,006,900	14,389,700	14,608,000
Liberty results	13,444,648	13,948,332	14,452,016	14,955,700	15,459,384
Difference, %	1.77%	2.27%	3.08%	3.78%	5.51%

Sources: ENGI results, Chart III-A-1; Liberty results computed as described.

Customer Requirements, Base Case Demand Scenario, Design-Year Weather

(MMBtu)

	2004-05	2005-06	2006-07	2007-08	2008-09
ENGI results	14,353,600	14,818,000	15,230,300	15,650,000	15,891,700
Liberty results	14,415,053	14,918,737	15,422,421	15,926,105	16,429,789
Difference, %	0.43%	0.68%	1.25%	1.73%	3.28%

Sources: ENGI results, Chart III-A-1; Liberty results computed as described.

[2] See, *e.g.*, the sections entitled "Residential New Construction Adjustment Factors" and "Commercial New Construction Adjustment Factors", at pp. 55-57 of Appendix A to the IRP.

[3] Our preference is for regression of use-per-customer data (*i.e.*, daily sendout divided by number of customers) against weather to determine base and use factors for each rate class, and then multiplying those factors by the forecasted number of customers in that rate class. (This is, in fact, how the Company estimates its normalized sendout information for its base, or "springboard", year.) For the estimates presented in the table, we regressed the data marked "Sendout for Customers Using Utility Capacity", provided in the Company's response to DR No. 1-1 in Docket No. DG 04-152, against the EDD data provided in the Company's response to DR No. 1-5 in DG 04-152, using an equation that allows for base and use factors that vary by month.

While the respective results are pretty close, Liberty estimates slightly higher requirements in every year, and the difference between the two forecasts increases over time.

Liberty recommends that the Company update its demand forecasting. We cannot insist that the Company use the econometric methods that we favor, rather than the end-use modeling approach that it has been using. We note, however, that the end-use modeling approach requires a large amount of input data, some of which is not available for New Hampshire.[4] The econometric methods, on the other hand, are primarily driven by intensive analysis of ENGI's own sendout and customer records. Thus, the question of whether adequate data exists for New Hampshire does not arise.

Q. What other results did you test?

A. We also tested effective degree-day (EDD) data, provided by the Company's weather services provider, against pure weather data (heating degree-days (HDD) plus wind).[5] Our test focused on the month of January 2004, which included some of the coldest weather on record. Our analysis showed a fit between sendout and the Company's EDD data that was better than the correlation between sendout and HDDs plus wind. Thus, the EDD data should be a better predictor of sendout than the pure weather data.

Q. Do you have other concerns?

A. Yes, we have an issue with the way that the Company estimates its design-day and design-year requirements for supply.

Q. Please elaborate.

---

[4] See, *e.g.*, Sections 4 and 5 (pp. 31-44) of Appendix A to the IRP.

[5] The HDD data and wind data that we used came from the U. S. National Oceanographic and Atmospheric Administration (NOAA). NOAA is the repository of weather records in the U. S. NOAA no longer maintains daily temperature data for Manchester, so we used data for Concord. The Company's EDD data is for Manchester.

A. The Company estimates its design-day and design-year requirements for supply by first estimating the costs to its customers of curtailment. The design-day calculation uses an estimated cost of curtailment to all customers, and the design-year calculation uses an estimated cost of curtailment to commercial and industrial customers. The curtailment costs are then used to establish the value to the Company's customers of incremental gas-supply resources.

Our problem is that the estimated curtailment costs are based on curtailment of an average customer: a blend of residential, commercial and industrial customers for the design day, and an average of commercial and industrial customers for the design year. In fact, if curtailment is necessary, it usually proceeds in reverse-priority order (lowest-priority customers curtailed first), pursuant to a Commission-approved curtailment plan. Curtailment is not usually applied uniformly across all customer classes, or across all commercial and industrial customers, as is implied by the Company's use of averages. We suspect that, if the Company's calculations were repeated using the costs of curtailment to lower-priority customers, the costs of curtailment would be lower, and thus the value of incremental gas-supply resources would be lower.

We are not opposed to the use of cost-benefit analysis for determining whether to add a marginal supply resource; in fact, we support that approach when properly applied. Our concern is that the Company's analysis is flawed.

Q. What do you suggest?

A. The Company reports that its curtailment plan is being revised.[6] When that revision is complete, we could work with the Company to refine its estimates of the cost of

[6] See the Company's response to our Data Request No. 1-48.

curtailment, and thus the value of incremental supply resources. Those values could then be used to identify an optimum level of gas-supply resources.

Q. Do you have other comments on the Company's Integrated Resource Plan?

A. Yes, we have two additional comments. First, the supply-side analysis in the IRP is too narrow, in our view. Even though the Company shows[7] that a number of its supply-side contracts will expire over the next five years, the Company assumes that the current supply-capacity portfolio is an appropriate "proxy" for the portfolio that the Company will use for the period covered by the IRP. The Plan uses its requirements forecasts and a "cold-snap analysis" to evaluate whether the Company's portfolio is adequate for meeting anticipated loads.

We would encourage the Company to take a broader look at the supply resources in its capacity portfolio. Using an optimization model such as SENDOUT (the one used by the Company), the Company can seek adjustments to its contract levels, if appropriate, as they expire. Certain features of the Company's supply-capacity portfolio, such as taking virtually all[8] city-gate deliveries from Tennessee Gas Pipeline, are fixed. It is possible, however, that use of the Tennessee capacity might be varied in response to changes in the prices of pipeline, storage and/or peaking resources, and in response to changes in the Company's load.

Second, in Section IV of the IRP, which discusses the design of the Company's supply-resource portfolio, the Company suggests that the Commission's "seven-day" rule[9] is too stringent:

---

[7] See the table (un-numbered) on p. IV-15 of the IRP.
[8] The exception, of course, is ENGI's small contract with the Portland Natural Gas Transmission System.
[9] PUC Rule 506.03 requires the Company to maintain an on-site storage capability that will provide peak-shaving supplies for an estimated maximum-design cold period of seven consecutive days.

PUC rule 506.03 ... require[s] the Company to maintain minimum inventory levels somewhat greater, and for longer time periods, than what the Company's historical experience would indicate as appropriate. Integrated Resource Plan, pp. IV-23, 24.

We have discussed this analysis with the Company. We understand from those discussions that the Company has capabilities in place – especially a) the ability to displace re-vaporized LNG from storage facilities in Massachusetts to city gates in New Hampshire via the Tennessee Gas Pipeline system, and b) a large storage facility in Haverhill, Massachusetts for storing propane – that may allow some relaxation of this rule. We look forward to an opportunity to discuss this matter further with the Company, to see if there are conditions under which we would be comfortable recommending such a relaxation to the Commission.

Gas Dispatch Investigation

Q. What do you have to report about the gas dispatch investigation?

A. Our work in this area focused on assessing the consequences for ENGI's customers of the Company's asset-management agreement (AMA) with Entergy-Koch Trading (EKT), particularly the consequences of the constraints on dispatch that are a key feature of that agreement. The functioning of the AMA, and particularly its constraints on dispatch, was a focus of the dispute between the Commission's Staff and the Company in Docket No. DG 03-160, 2003/2004 Winter Cost of Gas and Investigation, and it continues as a

reservation in the Company's cost-of-gas proceedings since that time.[10] This focus was also important because, under the AMA, the Company has an option to negotiate a change in the form of the AMA, in a manner that would eliminate the constraints on dispatch. The change would be effective April 1, 2005, but the Company's election had to be made by January 1, 2005.[11]

Q. What did you find?

A. Our analysis found that, indeed, the AMA's constraints on dispatch can have adverse consequences for ENGI's customers, but not all the time. The dispatch constraints are not a problem if the weather is normal, but they cause increased costs under certain weather conditions.

Q. Please explain.

A. The problem occurs when the Company's gas in market-area storage facilities has been depleted, but daily sendout is in a range where the dispatch restrictions in the AMA prevent the Company from using the supplies normally available under its FCS contract with Distrigas of Massachusetts (DOMAC). In that circumstance, the Company must buy spot-market gas, and that gas is often more expensive than the DOMAC supply. The difference between the price of the DOMAC supply and the price of the spot-market gas, times the volume of spot-market gas that must be bought in this circumstance, is a measure of the harm that the dispatch restriction causes to ENGI's customers.

[10] The issue of gas supply costs for the winter of 2002-2003 was settled. *See* Order No. 24,323, "Order Approving Settlement Agreement", issued in Docket No. DG 03-160 on May 7, 2004.
[11] The Company advised us in December that it had agreed with EKT to postpone the deadline for this election until February 1.

Q. How often does this occur?

A. In the recently-concluded Winter Cost of Gas proceeding (DG 04-152), the Company provided 23 years of EDD data in response to one of our data requests.[12] Using a simple spreadsheet-based dispatch computer model, we found that the constraint on access to the DOMAC supply would have changed the optimal gas-supply resource mix in eight of those 23 years.

Q. What weather conditions cause the dispatch constraint to limit access to the DOMAC supply?

A. The constraint limits access to the DOMAC supply when weather conditions involve a winter with sustained cold. 2002/2003 was such a winter, but 2003/2004 was not. January 2004 included some of the coldest weather on record; overall, however, that winter was approximately normal in terms of the number of degree-days experienced. With that weather pattern, stored volumes were available throughout the winter, so the constraint on access to the DOMAC volumes had no consequences for ENGI's customers. Some very expensive spot-market gas had to be acquired during January of 2004, but that gas was acquired in addition to the DOMAC supply, rather than in place of it.

2002/2003, on the other hand, was a colder-than-normal winter. In that year, storage was depleted but the Company did not have access to the DOMAC volumes in the range of sendout where the Company could have used the DOMAC gas to substitute for storage gas (sendout between 49,718 and 77,833 MMBtu/day). We did not attempt to estimate by how much costs to ENGI's customers were increased by the restriction, since

[12] Docket No. DG 04-152, Data Request No. 1-5.

the Commission's Staff and the Company had settled the issue of consequences for ENGI's customers in Docket No. DG 03-160.

Q. What do you conclude from your analysis?

A. We believe that the restrictions on dispatch that are part of the Company's AMA with Merrill Lynch Commodities (Merrill Lynch is the successor to Entergy-Koch Trading) are unwise. While the weather conditions that cause these restrictions to be binding occurred in only eight of the last 23 years, we believe that the potential harm to ENGI's customers is sufficiently large in those eight years to more than offset any benefit that those customers might obtain from allowing the restrictions to remain in place.

As noted earlier, those restrictions have been a feature of the AMA entered into by ENGI with its asset manager, originally Entergy-Koch Trading, and now Merrill Lynch Commodities. That agreement, entered into in the spring of 2003, is a three-year agreement, and will not expire until the spring of 2006. The agreement provides for the possibility of conversion to an alternate form, without the restrictions on dispatch, at ENGI's election. ENGI's choice was to have been made effective April 1, 2004; the Company's asset manager agreed to a postponement of the election to April 1, 2005, however.

Q. Have you shared your analysis with the Company?

A. We have. With the Commission's Staff, we met with the Company on December 14, 2004, in one of a series of technical meetings held in the course of this proceeding. We presented not only the results of our analysis, but also our methodology, in case we had made a mistake, or in case we had overlooked some factor that would offset our findings.

To date, we have not received any indication from the Company that it disagrees with our analysis.

Q. Has the Company provided any indication of whether it intends to change the form of its AMA, in line with your recommendation?

A. At the meeting on December 14, the Company indicated that it had initiated discussions with Merrill Lynch Commodities regarding the change. We have not heard further from the Company on this point since that time.

Q. What about the winter of 2004/2005?

A. To date, the winter of 2004/2005 has been warmer than normal. At the time that this testimony is being written, however, it seems to be tending toward normal.

In any event, the stipulation entered into by the Company with the Commission's Staff in the 2004/2005 Winter Cost of Gas proceeding (DG 04-152) should limit any adverse consequences of the dispatch restrictions for ENGI's customers. That stipulation provides that the Company will replenish storage during the winter, to maintain storage inventory levels sufficient to avoid premature depletion. We believe that, if the Company adheres to its undertakings in that stipulation, any consequences for ENGI's customers of a period of sustained cold between now and the end of the winter should be limited.

For the winter of 2005/2006, which will be the last winter of the current AMA, we are hopeful that changing the form of the AMA to an alliance will eliminate the dispatch restrictions that are the source of the problem.

Q. Do you have other recommendations?

A. We do. As suggested by our analysis, we feel strongly that the Company should avoid any restrictions on dispatch in the arrangements that we presume it is negotiating now

with its asset manager. We also recommend that, whatever is the outcome of those negotiations, the new agreement should be submitted to the Commission for approval.

Q. What are your plans for completing your work?

A. At Staff's request, we will submit a report and work with all parties on how best to address the concerns raised in our report and implement cost-effective changes.

An immediate and critical concern is how best to amend the existing asset management agreement, and an evaluation of the proposed amendment. At the Company's request, we will be available in an advisory capacity during the negotiations, and we will assist Staff in its evaluation of the amended agreement when filed with the Commission.

The Company's IRP suggested a relaxation of the Commission's seven-day storage requirement, and we will assist in determining expected savings and setting specific conditions under which the Commission might grant such a waiver; conditions designed to achieve the desired saving without reducing reliability.

Our report will identify supply planning and operations concerns, and we will work with the parties in addressing those concerns. We will assist in establishing reporting requirements, both for internal reporting by the Company and external reporting to the Commission.

Some of these objectives are beyond the original cost and scope of services covered in the existing contract between Liberty and the Commission. Nevertheless, we will address each concern to the greatest extent possible under the existing contract. Staff has requested that we submit a proposed amendment to the contract that would enable us

to carry out additional follow-up work to address the concerns and implement recommendations contained in our testimony and report, and we will do so accordingly.

Q. Does that conclude your testimony?

A. Yes, it does.

JOHN B. ADGER, JR.

Areas of Specialization

Strategic analysis and business planning for the natural gas industry; natural gas supply and procurement strategy; natural gas marketing strategy; U.S. and Canadian gas industry regulation. Also, management studies for public utility commissions.

Relevant Experience

U.S. and Canadian Gas Industry Regulation

Served as an extension of the Staff of the Connecticut Department of Public Utility Control in a general rate case for the State's largest distributor, Yankee Gas Services Company. Principal responsibilities were gas supply/gas cost, system expansion, interruptible target margin, and manufactured gas plant remediation.

For a regional marketer of gas and electricity, directed an analysis of the role of the purchased-gas-cost adjustment mechanism in forming retail prices for natural gas in Ohio.

Served as an extension of the Staff of the Connecticut Department of Public Utility Control in a prior general rate case for Yankee Gas Services Company. Principal responsibilities were Yankee's proposed expansion plans, including special rate provisions to support those plans; evaluation of a proposed liquefied natural gas production and storage facility; manufactured gas plant remediation; and gas supply/gas cost. Assisted the Staff in subsequent evaluations of the proposed LNG facility.

Served as an extension of the Staff of the Connecticut Department of Public Utility Control for its consideration of the winter 2000/2001 purchased-gas adjustments of the three gas distributors in Connecticut, Connecticut Natural Gas Corporation, The Southern Connecticut Gas Company and Yankee Gas Services Company.

Served as an extension of the Staff of the Connecticut Department of Public Utility Control for its consideration of an audit of the affiliate relationships of The Southern Connecticut Gas Company.

Served as an extension of the Staff of the Connecticut Department of Public Utility Control for its consideration of proposed incentive rate plans for The Southern Connecticut Gas Company and Connecticut Natural Gas Corporation. Principal responsibilities were gas-cost reduction incentives, and comparative analysis of plans used in other jurisdictions.

Served as an extension of the Staff of the Connecticut Department of Public Utility Control for its consideration of Consolidated Edison Company's proposed acquisition of Northeast Utilities. Principal responsibilities included affiliate relationships and evaluation of the effects of the transaction on gas supply options for Connecticut.

Presented expert witness testimony on FERC rate-design policy to a pipeline-rates proceeding before the Railroad Commission of Texas.

Served as an extension of the Staff of the Connecticut Department of Public Utility Control for two distribution-company rate cases (The Southern Connecticut Gas Company and Connecticut Natural Gas Corporation), and one facilities-certification proceeding.

For the staff of a regulatory commission in the northeast U.S., evaluated a gas-service and capacity-release project that was proposed by a jurisdictional utility.

Directed Liberty's analysis for the Georgia Public Service Commission of the impacts of FERC's Order 636 on gas rate structures in Georgia.

Prepared and presented a seminar on U.S. regulation of oil and gas pipelines for staff members of the Argentina Task Force on Privatization of the Oil Industry.

For a syndicate of U.S. and Canadian commercial banks, prepared an analysis of the influence of certain FERC Gas Tariff issues on pipeline cash flow. Also provided technical support to a "due diligence" investigation for project-type financing.

For a major U.S. pipeline company, prepared an analysis of certain Federal (FERC, Council on Environmental Quality) and State (California) regulatory issues.

Directed an evaluation of the marginal costs of the District of Columbia Natural Gas Company, a division of the Washington Gas Light Company, for the Public Service Commission of the District of Columbia.

For Yankee Gas Marketing (subsequently Enron Access Energy), directed an analysis of line-of-business restrictions as applied to the gas industry. This analysis was attached to Yankee's filing in the FERC's rule-making proceeding regarding rules of conduct for pipeline-affiliated marketers (proceeding resulted in the issuance of FERC Order 497).

For the U.S. Department of Energy, financial institutions, pipelines, and distribution companies, prepared various studies exploring the impacts of regulatory change on segments of the gas industry and on specific firms.

For the U.S. Department of Energy, participated in a study of Canadian gas export policies, and the potential influence on U.S. policies toward gas imports.

Served as Director of the U.S. Federal Energy Regulatory Commission's Alaska Gas Project Office. Evaluated financing and tariff aspects of gas transportation system proposals. Responsible for policy

development, managing FERC proceedings, representing the FERC to government and industry, and liaison with counterpart officials in the Government of Canada.

Served as Director of the U.S. Federal Energy Administration's Office of Energy Project Operations. Evaluated legislative and regulatory impediments to energy project development. Recommended changes and prepared testimony.

As a Policy Analyst for the Federal Energy Administration, produced research, analysis, writing, and recommendations in oil and gas exploration and production, price control and allocation programs for crude oil and petroleum products, and the international petroleum market.

Management Studies for Public Utility Commissions

Currently serving as Leader of the Gas Procurement Analysis Team in a focused audit of affiliate transactions and general management audit of South Jersey Gas Company for the New Jersey Board of Public Utilities. Responsible for all reviews in the focused audit, and for the review of system operations in the general management audit.

Evaluated the fuel-oil and natural-gas supply activities of Nova Scotia Power, Inc. for the Staff of the Nova Scotia Utility and Review Board. Presented testimony to the Board regarding findings.

Lead consultant on Liberty's focused audit of the affiliate relationships within NUI Corporation, parent of Elizabethtown Gas Company, for the New Jersey Board of Public Utilities. Responsible for the review of transactions among NUI's energy affiliates.

Lead consultant on Liberty's management audit of the gas-purchasing function at the five largest gas distribution companies in Kentucky (Columbia Gas of Kentucky, Delta Natural Gas Company, Louisville Gas & Electric Company, Union Light, Heat and Power Company, and Western Kentucky Gas Company) for the Kentucky Public Service Commission. Responsible for reviews in gas supply planning, supply management, gas transportation services and system balancing.

Lead Consultant on Liberty's examination of cost allocation issues at Arkansas Western Gas Company for the Arkansas Public Service Commission. Responsible for the review of staffing levels.

Lead Consultant on Liberty's management audit of The Southern Connecticut Gas Company for the Connecticut Department of Public Utility Control. Responsible for reviews of gas supply and marketing activities, and manufactured gas plant remediation activities.

Lead Consultant on Liberty's management audit of Connecticut Natural Gas Corporation for the Connecticut Department of Public Utility Control. Responsible for reviews of gas supply and marketing activities.

Managed Liberty's audit of the gas purchasing and supply management policies and practices of K N Energy, Inc. for the Wyoming Public Service Commission. Responsible for the reviews of gas acquisition, gas transportation and storage, relationships with affiliates, and response to regulatory

change. Conducted supplemental evaluations in response to Liberty's initial findings, and presented testimony to the Commission in the proceeding to consider K N's pilot program for unbundling its services in Wyoming.

Lead Consultant on Liberty's management audit of Yankee Gas Services Company for the Connecticut Department of Public Utility Control. Responsible for the review of gas supply activities and manufactured gas plant remediation activities.

Consultant on Liberty's management audit of the Tennessee operations of United Cities Gas Company for the Tennessee Public Service Commission. Responsible for reviews in system operations, marketing, and affiliate relationships.

Lead Consultant on Liberty's audit of gas purchasing policies and practices at Pike Natural Gas Company and Eastern Natural Gas Company for the Public Utilities Commission of Ohio. Responsible for the reviews of gas acquisition, gas transportation services, and response to regulatory change.

Consultant on Liberty's audit of the affiliate relationships of Public Service Enterprise Group (holding company for Public Service Electric & Gas Company) for the New Jersey Board of Regulatory Commissioners. Responsible for reviews of systems and processes, affiliate relationships, and transaction analysis with regard to (a) the purchase of gas from the Group's gas-producing subsidiary, (b) the purchase of electric power from the Group's IPP subsidiary, and c) the Group's real estate subsidiary.

Led the evaluation of gas supply activities as part of Liberty's management audit of New York State Electric & Gas Corporation for the New York Public Service Commission.

Lead Consultant on a general management audit of the Peoples Natural Gas Company, a subsidiary of Consolidated Natural Gas Corporation, for the Pennsylvania Public Utility Commission. Responsible for the review of gas-supply activities.

Other Experience

Strategic Analysis and Business Planning

Consultant on a merger-benefits study performed for an electric distribution cooperative and a local farmers' cooperative.

Lead consultant on a business-enhancement project for a Rocky-Mountain-area electric cooperative. Responsible for diversification-planning task.

For an investment banking group, identified themes for enhancing the value of gas distribution and transmission/storage business segments through acquisitions, and used those themes to develop criteria for acquisitions.

Co-directed a project to develop a comprehensive unbundling strategy for a gas distributor with operations in 12 states.

Directed a project to assist an electric utility in exploring opportunities in related businesses. Options considered included gas pipeline and storage projects; distribution of other fuels including natural gas, propane and heating oil; and ventures in telecommunications.

For a combination electric and gas utility company in the Midwest U.S., participated in a major re-evaluation of its strategy for its gas business unit.

For a major Canadian pipeline company, prepared an analysis of strategic factors in U.S. pipeline industry mergers. Subsequently presented findings of the study to the company's Corporate Strategy and Policy Committee.

For an investor group, evaluated three gas-gathering systems and an intra-state pipeline for possible acquisition. One gathering system was acquired, and a workout plan was developed.

For two gas distribution companies, consulted on strategy development for non-utility subsidiaries.

For a syndicate of U.S. and Canadian commercial banks, evaluated financing and tariff restructuring for a major U.S. interstate pipeline company.

For a major Canadian pipeline company, prepared a study of possible changes in rate design and capacity planning with decontrol of the Canadian gas market. Also researched pipeline capacity allocation problems and their relationship to rate design.

Conducted several assignments in business strategy development for gas distribution companies: market segmentation, cost allocation, structuring tariffs and service contracts, *etc.*

Evaluated several U.S. pipeline companies for possible acquisition by investor groups.

Participated in evaluation of the economic viability of gas-fired cogeneration projects for equity investors and banks. Evaluations included the impact of possible regulatory change.

Natural Gas Supply Strategy

For two municipal electric power systems, directed an evaluation of capacity availability on a pipeline-system segment serving a large number of gas-fired electricity-generating facilities. The results of that evaluation were used to develop alternative approaches to gas-supply contracting for a generating facility owned by the cities.

For Kansas Pipeline Operating Company, evaluated certain gas supply contracts entered into by Western Resources' KPL Gas Service Company, and Southern Union's Missouri Gas Energy. Presented testimony to the Kansas Corporation Commission, and to the Missouri Public Service Commission.

Performed gas supply evaluations as part of a general work process improvement study for a power-supply cooperative in the southeast U. S.

For a steam utility in Pennsylvania, solicited offers for gas supply, and helped evaluate the responses.

For the Potomac Electric Power Company, assisted in the development of comprehensive policies and procedures for fuels procurement. Responsible for gas acquisition policies and procedures.

Directed development of a gas supply strategy for a power-supply cooperative's first combustion turbines. (Coop's generation previously all coal-fired.)

For Delmarva Power & Light Company, assisted an internal review of gas supply planning for electric power generation.

Served as gas supply consultant to two major Midwestern gas distributors. In that capacity, directed development of long-term supply plans, short-term contracting strategies, and peak-load management plans. Also provided staff support to teams formed to negotiate with producers regarding long-term gas supply contracts, and with pipelines regarding conditions of service. Directed quantitative analysis of particular supply decisions, and did documentation projects.

For an investment banking group, explored the influence of the Midland Cogeneration Project's gas supply contracts on the Project's economic viability.

For the Interstate Natural Gas Association of America (trade association of gas pipeline companies), participated in a comparative study of supply contracting practices for gas, coal, and fuel oil. Developed recommendations for gas supply contracting.

For the Wisconsin Distributors Group, directed an analysis of gas supply alternatives for the State of Wisconsin. Directed a similar study of gas supply alternatives for the municipal Gas Department of the City of Charlottesville, Virginia.

Natural Gas Marketing Strategy

Assisted a production-area storage developer in identifying prospective users of a proposed gas storage facility, and in marketing interests in the project.

For National Fuel Gas Supply Corporation, analyzed potential markets for gas storage and pipeline capacity in particular sectors and particular geographic areas. Also recommended opportunities in electric utility industry restructuring for consideration by NFGS management.

For an offshore supplier of LNG, participated in an evaluation of North America as a potential market for its gas.

For the municipal Gas Department of the City of Charlottesville, Virginia, directed a rate design study. Also recommended modifications to customer service agreements.

For the Canadian Petroleum Association and the Independent Petroleum Association of Canada, participated in an analysis of regional markets for Canadian gas in the U.S.

For various U.S. and Canadian gas producers, evaluated particular regional and sectoral gas markets in the U.S. Also developed strategies for market penetration.

For U.S. and Canadian producers and pipeline companies, directed analyses of alternative gas transportation systems. Also for U.S. gas distribution companies.

For U.S. and Canadian gas pipelines and marketers, participated in preparation of a multi-client study of the market for residual fuel oil. Also developed strategies for gas sellers to use in competing with residual oil.

Prior Experience

As a geologist for Mobil Oil Corporation, conducted oil and gas exploration activities in Libya and Indonesia.

Education

M.S., *cum laude*, Geology and Geophysics, The Massachusetts Institute of Technology
B.S., *cum laude*, Earth Sciences and Chemical Physics (double major), The Massachusetts Institute of Technology

Publications and Conference Presentations

Presented a paper entitled "The Alaska Gas Pipeline: Déjà Vu All Over Again" to the Deutsche Banc Alex. Brown 2001 Global Energy Perspectives Conference. February 2001.

Presented a paper entitled "Regulatory Perspectives on Performance-Based Rate-Making" to a meeting of the Rates and Strategic Issues Committee, American Gas Association. April 2000.

Presented a paper entitled "Capital Budgeting for the New Millenium" at the Conference on Gas Company Productivity and Management, sponsored by the Institute of Gas Technology. November 1999.

Presented a paper entitled "Can the Conflict Between Maintenance/Replacement Projects and Expansion/Upgrade Projects Be Mitigated by Using a Different Approach to Capital Budgeting?" at the Conference on Gas Company Management Under Limited Budgets, sponsored by the Institute of Gas Technology. October 1998.

Presented a paper entitled "Skills for Effective Competition" at the IGT Technical Business Forum on Enhancing Corporate Performance, sponsored by the Institute of Gas Technology. September 1997.

Panelist on Contract Abandonment at a public seminar entitled "Natural Gas: The Regulatory Crisis Now," sponsored by *The Energy Daily*. July 1987.

Presented a paper on the natural gas pipeline industry to *The Energy Week* Conference, held annually by The First National Bank of Chicago. April 1987.

Presented a paper entitled "New Approaches to Gas Supply Strategies" at a symposium entitled The Outlook for Gas Distributors in the New Market Place, sponsored by the Institute of Gas Technology. November 1986.

Presented a paper entitled "Diversification Issues in the Natural Gas Industry" to the Williamsburg Conference on the Institute of Public Utilities. December 1984. Later published in *The Impact of Deregulation and Market Forces on Public Utilities: The Future Role of Regulation*, edited by Patrick C. Mann and Harry M. Trebing (MSU Public Utilities Papers, 1985).

Presented a paper entitled "International Competition in the California Gas Market" at the Annual North American Conference of the International Association of Energy Economists. November 1984.

Presented a paper on the Alaska Natural Gas Transportation System entitled "The Intersection of 'Public' and 'Private': Studies in Energy Decision Making" to a panel at the Annual Meeting of the American Political Science Association. August 1984.

YAVUZ ARIK

Mr. Arik has over fourteen years of experience in the area of computer technology, including quantitative modeling, energy economics, and information systems. He has extensive experience in the area of natural gas resource optimization modeling, demand forecasting, and load research.

Mr. Arik has lead the development of the following information system models for various clients:

- **Gas supply optimization**: Resource Optimizing Gas Model (ROGM), a comprehensive gas optimization model to provide in-depth analysis for integrated least cost planning, demand-side management program evaluation, rate cases, marginal cost analysis, strategic resource planning, cost-of-service studies and unbundling studies. Clients are currently using ROGM over the Internet. Some of the studies based on this model have been filed with public service commissions. This model is used to analyze tradeoffs between reserve requirements, cost of gas supply, and resource acquisition and utilization for gas distribution companies by formulating the optimal usage mix of available resources.

- **Forecasting for gas and electric utilities**: Developed a comprehensive gas and electric demand-forecasting model for an energy services company. The system uses load research data for customer groups along with weather data and monthly historical demand data to develop Monte Carlo simulations of system demand and demand variability by weather and other factors. This model can be used in tandem with ROGM to develop short-term and long-term supply planning and portfolio analysis.

- **Line extension evaluation**: Utilities often consider extending their service to new development areas, and the economic evaluation of such extensions can be performed using this model.

- **Tariff document management**: Regulated utilities must prepare their tariffs and submit these documents for approval within the company and subsequently with their public service commission. This system provides a uniform document editing and review system to ensure ease of review and uniformity of submitted tariffs.

- **Case management**: This system allows its users to manage all information exchanged with a public service commission. This model is especially valuable to utilities to 1) keep a consistent archive of information related to cases, 2) to allow easy retrieval of information relevant to a particular topic to ensure consistency of responses provided, and 3) to manage

responses to the public service commission within the company by routing, enforcing proper legal and management review and ensure accuracy in timely responses and content provided.

- **Clinical trial management**: The Clinical Trial Management System (CTMS) allows clinical trial sites for pharmaceuticals to coordinate clinical study patients and data, ensuring strict adherence to trial protocols, budgeting, employing audit trails and security in data management in terms of data privacy, encryption and archiving.

- **Grants management**: Created a grants database system for the National Institute on Drug Abuse (NIDA) to track funding and post-award research. Originally started as a branch project, the database has been upgraded for division-wide access, and is currently being upgraded for web-enabled access.

- **Automated survey system**: Created an automated telephone survey system to conduct and manage surveys for a project with the National Institute of Child Health and Human Development (NICHD).

PROFESSIONAL EXPERIENCE

Over the past years, Mr. Arik has worked on numerous engagements involving regulatory change management, load forecasting, supply and demand side planning, management audits, costing and rate design analysis, and mergers and acquisitions. Representative clients are provided for each of these areas in the subsections below.

Regulatory Change Management. Mr. Arik has recently been assisting both electric and natural gas utilities as they prepare to operate in a restructured industry. This work has involved the development of unbundled cost of service studies (i.e. separation of transmission, distribution and energy costs); the development of strategies that will allow companies to prosper in a restructured industry; retail access program development, implementation, and evaluation; and the development of innovative ratemaking approaches to accompany changes in the regulatory structure. Representative clients for whom he has performed such work include:

- BOTAS
- Kansas Corporation Commission
- National Rural Electric Cooperatives Association
- Central Louisiana Electric Company
- Washington Gas Light Company
- Kansas Gas Service Company.

Load Forecasting. Mr. Arik has prepared load forecasting studies for electric and natural gas utilities, including end-use models. These studies involve Monte Carlo simulations and time-series analysis to model probabilistic distributions of various scenarios. This work has also included the development of elasticity of demand measures that have been

used for attrition adjustments and revenue requirement reconciliation. Representative clients for whom he has performed such work include:

- Washington Gas Energy Services
- Central Louisiana Electric Company
- Kansas Gas Service Company
- Washington Gas Light Company.

Supply Side Planning. Mr. Arik has worked on several supply-side planning projects, involving the evaluation of short-term and long-term gas supply and resource plans using ROGM. These plans have included load forecasting, calculation of avoided costs, strategic resource acquisition, supply related contract evaluation, determination of optimal sizes and types of capacity to install, determination of production costs including and excluding the resource, and an assessment of system reliability changes as a result of different resource additions.

Management Audits. Mr. Arik has been involved in a number of management audits. Consistent with his other experience, the focus of his efforts has been in the areas of load forecasting, demand- and supply-side planning, and integrated resource planning. Demand-side planning involves the forecasting of future demands; the design, development, implementation, and evaluation of demand-side-management programs; the determination of future supply-side costs; and the integration of cost-effective demand-side-management programs into an Integrated Least Cost Resource Plan. Representative commission/utility clients working under the Liberty Consulting Group are as follows:

- New Jersey Board of Public Utilities/South Jersey Gas Company
- Kentucky Public Service Commission/Louisville Gas & Electric
- Kentucky Public Service Commission/Columbia Gas of Kentucky-NiSource
- Kentucky Public Service Commission/Delta Natural Gas Company
- Kentucky Public Service Commission/ULHP-Cinergy
- Kentucky Public Service Commission/Western Kentucky Gas-Atmos
- Public Utilities Commission of Ohio/Vectren Energy Delivery of Ohio
- Public Utilities Commission of Ohio/Cincinnati Gas and Electric Company.

Mergers and Acquisitions. Mr. Arik has been involved in a number of merger and acquisition studies throughout his career. Many of these were conducted as confidential studies and cannot be listed. Those in which his involvement was publicly known are:

- ONEOK, Inc./Southwest Gas Corporation
- Western Resources.

Costing and Rate Design Analysis. Mr. Arik has used ROGM to conduct marginal cost, cost of service, gas supply and resource planning studies for utility clients. Various studies have been used for filings with public service commissions and for integrated

resource planning. Mr. Arik has performed specific costing and rate design studies for the following companies:

- Western Resources
- Kansas Gas Service Company
- Central Louisiana Electric Company
- Washington Gas Light Company.

EDUCATION

After graduating from Galatasaray Lycee in Istanbul, Turkey, Mr. Yavuz Arik earned a B.S. degree in Industrial Engineering from Bogazici University in Istanbul, Turkey and an M.A. in Economics from Georgetown University. Mr. Arik is fluent in Turkish and French.